

B. AMENDMENTS TO THE CLAIMS

Please add new claims 22-30 as follows:

22. (new) A probe having a radiation source at a distal end, comprising:
 - A. a probe assembly including an optical delivery structure adapted for transmitting optical radiation;
 - B. an optical source for generating optical radiation directed to an end of said optical delivery structure;
 - C. a radiation source coupled to a distal end of said optical delivery structure, said radiation source comprising a thermionic cathode and a target element;
 - a. wherein the thermionic cathode is responsive to said optical radiation transmitted to said distal end to emit electrons, and wherein said thermionic cathode comprises a spiral-shaped conductive element; and
 - b. wherein said target element is responsive to incident electrons emitted from said thermionic cathode to emit radiation;
 - D. means for establishing an accelerating electric field extending between said electron source toward said target element, the electric field being effective to accelerate electrons emitted from the thermionic cathode toward said target element;

wherein said optical delivery structure is adapted to direct a beam of optical radiation transmitted therethrough to impinge upon a surface of the thermionic cathode, and wherein said beam of transmitted optical radiation has a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface.
23. (new) A probe in accordance with claim 22, wherein said optical source comprises a laser.
24. (new) A probe in accordance with claim 22, wherein said radiation source comprises an x-ray source, and said radiation emitted from said target element comprises x-rays.

25. (new) A probe in accordance with claim 22, wherein said optical delivery structure comprises a fiber optic cable.

26. (new) A probe in accordance with claim 22, wherein said radiation source comprises a substantially rigid housing enclosing said thermionic cathode and said target element, wherein said housing defines a substantially evacuated interior region extending along said beam path between a proximal end and a distal end of said housing.

27. (new) A probe in accordance with claim 22, wherein said spiral-shaped conductive element defines a plurality of spaced apart turns with an interstitial space between each successive turn.

28. (new) A probe in accordance with claim 22, wherein said spiral-shaped conductive element forms one of a planar coil and a helical coil

29. (new) A radiation source, comprising:
A. a probe assembly including an optical delivery structure, said optical delivery structure being adapted for transmitting optical radiation incident on a proximal end thereof to a distal end thereof;
B. an optical source for generating a beam of optical radiation directed to said proximal end of said optical delivery structure;
C. a radiation generator assembly coupled to said probe assembly, including:
a. an electron source, responsive to optical radiation transmitted to said distal end of said optical delivery structure, for emitting electrons, the electron source including a thermionic cathode having an electron emissive surface; wherein said
b. a target element including at least one radiation emissive material adapted to emit radiation in response to incident accelerated electrons from said electron source; and
D. means for providing an accelerating voltage between said electron source and said

target element so as to establish an accelerating electric field which acts to accelerate electrons emitted from said electron source toward said target element;
wherein said optical delivery structure is adapted for directing a beam of optical radiation transmitted therethrough to impinge upon a surface of said thermionic cathode, and wherein said beam of transmitted optical radiation has a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface.

30. (new) A flexible probe having an x-ray tube as a distal end, comprising:

- A. an optical source for generating optical radiation,
- B. a flexible optical fiber having a proximal end and a distal end, and adapted for transmitting optical radiation incident on said proximal end to said distal end;
- C. an x-ray tube coupled to a distal end of said optical fiber, comprising a substantially rigid housing enclosing a thermionic cathode and an x-ray target,
 - a. wherein the thermionic cathode is responsive to said optical radiation transmitted to said distal end to emit electrons; wherein said thermionic cathode comprises a spiral-shaped conductive element; and
 - b. wherein said x-ray target is responsive to incident electrons emitted from said thermionic cathode to emit x-rays ;
- D. means for establishing an electric field to accelerate electrons emitted from the thermionic cathode toward said x-ray target;
wherein said optical fiber is adapted to direct a beam of optical radiation transmitted therethrough to impinge upon a surface of the thermionic cathode, and
wherein said beam of transmitted optical radiation has a power level sufficient to heat at least a portion of said surface to an electron emitting temperature so as to cause thermionic emission of electrons from said surface.